

# Utah Department of Environmental Quality Division of Solid and Hazardous Waste Fact Sheet



November 2005

## PERCHLORATE

This fact sheet describes the Department of Environmental Quality's (DEQ) interest and concern regarding perchlorate in the State of Utah.

## WHAT IS PERCHLORATE?

Perchlorate is a compound consisting of one chlorine atom surrounded by oxygen atoms. It can occur naturally but is primarily produced for industrial uses. Perchlorate is commonly combined with ammonium, potassium or metals to form a solid salt.

Ammonium perchlorate is the most common perchlorate salt in Utah. Ammonium perchlorate is used as an ingredient in solid rocket propellants.

Perchlorate, an unregulated compound, is increasingly being found in the environment. Its occurrence in the environment can be attributed to past waste handling practices at facilities that manufacture or use this material.

## WHY IS PERCHLORATE A CONCERN?

- Perchlorate has potential adverse human health effects.

- Perchlorate may have an adverse effect on ecosystems.
- Perchlorate salts readily dissolve in water and can persist for many decades under typical groundwater and surface water conditions.
- Perchlorate is difficult to remove from ground and surface waters using standard water treatment processes.

## HOW DOES PERCHLORATE AFFECT HUMAN HEALTH?

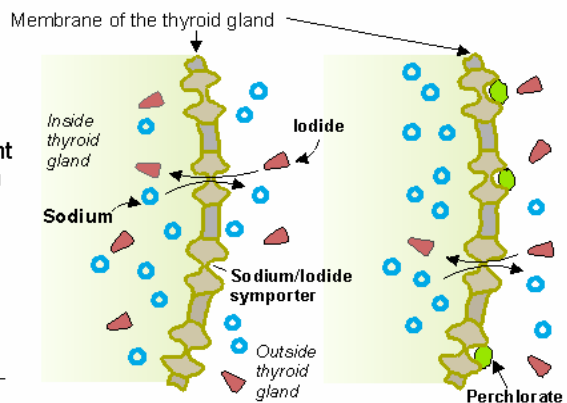
Perchlorate is what scientists refer to as an endocrine disrupter, because it can alter hormone levels. Perchlorate

blocks iodine and inhibits iodine uptake in the thyroid gland. Iodine is an essential component of the thyroid hormones. Perchlorate disrupts the thyroid's function. The figure below shows how perchlorate interferes with the production of thyroid hormones.

In adults, the thyroid helps to regulate metabolism. In children, the thyroid plays an important role in proper development and in regulating metabolism. An impairment of thyroid function may impact the fetus or newborn, resulting in changes in behavior, delayed development and decreased learning capability.

## Blocking Agent

In the human body, perchlorate inhibits production of thyroid hormones, essential to normal organ development in babies, especially brain development.



1 Iodide from foods, such as salt, enters the body.

2 Iodide is transported into the thyroid by the sodium/iodide symporter (NIS) as sodium is transported out. The iodide is then used to produce thyroid hormones.

3 If perchlorate is ingested, it blocks the symporter, disrupting the uptake of iodide.

Modified from: Environmental Protection Agency, Environmental Working Group

Exposure to perchlorate may also result in thyroid gland tumors. In the EPA's draft analysis of perchlorate toxicity, the EPA determined that perchlorate's disruption of the iodide uptake in the thyroid gland is the key event that can lead to changes in development and/or tumor formation.

### **WHERE IS PERCHLORATE FOUND IN UTAH?**

Utah has an active aerospace industry and a number of large military installations. In addition, the America Pacific Corporation in Cedar City, Utah, is the only manufacturer of ammonium perchlorate in the United States.

Since 1997, DEQ has identified perchlorate contamination at the following sites in the State of Utah:

- ♦ ATK Thiokol Inc., Bacchus Works
- ♦ ATK Thiokol Inc., Promontory Facility
- ♦ Hill Air Force Base
- ♦ Dyno Nobel, Site B (Pelican Point)
- ♦ Dyno Nobel, Tooele Test Site
- ♦ Utah Test & Training Range
- ♦ Wendover AFB, (FUD site)

DEQ continues to work with these facilities to assess the magnitude and extent of the contamination, and manage the exposure pathways to protect human health and the environment.

### **PERCHLORATE REGULATION AND REMEDIATION.**

In February 2005, the EPA published a revised human health reference dose (RfD) for perchlorate of 0.0007 mg/kg/day. A reference dose (RfD) is an estimate of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. It is also known as a virtually safe dose.

The 0.0007 mg/kg/day RfD for perchlorate equated to a drinking water equivalent level (DWEL) of 24.5 ppb. The DWEL is a regulatory guideline and is protective of a lifetime exposure if the only exposure is from drinking water.

While perchlorate is currently not regulated under the National Drinking Water Regulations, it is on the Contaminant Candidate List for the Safe Drinking Water Act. With the publication of the revised RfD, EPA can begin the process of establishing a regulatory level or maximum contaminant level (MCL) for perchlorate.

The Division of Solid and Hazardous Waste is using R315-101 of the Utah Code Annotated to develop remediation goals for

perchlorate contaminated sites in Utah. R315-101 is the risk-based cleanup and closure rule. This rule outlines how to develop site specific cleanup standards.

### **WHERE CAN I GET MORE INFORMATION ABOUT PERCHLORATE?**

For additional information on the toxicological effects of perchlorate, DEQ suggests that you search the National Center for Environmental Assessment website:

<http://cfpub.epa.gov/ncea/>

For general information about perchlorate, click on the following link:

[ITRC Perchlorate Overview, Status and Remedial Options.PDF](#)

For information on treatment technologies, review the EPA Federal Facilities Forum issue paper of perchlorate treatment technologies, click on the following link:

[EPA Perchlorate Treatment Technology Update.PDF](#)

#### **Additional Information**

For additional information regarding perchlorate issues in Utah, please contact:

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